

of interest being at the center. The analysis goes from one mode, that is one line at a particular angle, to the next mode at a different angle, etc.

We are not quite sure what the Examiner is referring to by "two dimensional Fourier space converted to one dimensional". As above explained, the line of pixels is a two dimensional figure. We used the term one dimensional to refer to the chain of pixels as being in a line or string, and it is the line or string that is disposed at different angles or modes.

We hope the foregoing will assist the examiner.

The Examiner's 103 rejections over 5,933,540 in view of 6,208,763 is respectfully traversed, especially in light of the new claims.

No combination of these cited references would make obvious the instantly claimed invention.

Briefly, as shown more clearly, in FIG. 5, for example, our invention encompasses a method of processing images having noise removed therefrom and preserving fine details, wherein a line of pixels are defined with a pixel of interest at the center of the chain, and a plurality of such lines or chains are defined at different angles or modes. One such line is first selected and a variance is calculated of pixel values thereof which is compared with a desired pixel value. Then, depending on whether the calculated value is less than the desired value, eventually, an average pixel value is calculated and then such average pixel value is used to produce the image. This is done for all of the different lines of pixels (or called modes). The resulting image contains the detailed fine descriptions of the object, without having the

repeated process used in the prior art, which slows down the image making. Advantageously, our method is fast, reliable and accurate.

In contradistinction, Lakshimanaranen 5,933,540 (called 540) teaches a filter system using three branches, each of which receives an image data array and modified image data array. Each branch has a gain control which is used to modify the modified image data array based on a gain factor. Then, an assimilation means combines the modified image data arrays to derive an improved image data array. In another embodiment, the intensities corresponding to the pixels are adjusted to be within a predefined range.

Clearly, 540 does not operate on a center pixel of a line of pixels to obtain a variance which is then compared with a desired variance, and then ultimately used to produce an average pixel value, which is then used to produce the image.

In the way done by 540, the filtering is not related to the variance taken from the pixel centers of lines of pixels and then compared to a desired pixel variance value and then used to obtain the average pixel value, which is then used to produce the image.

Furthermore, Avinash does not provide teachings of the above discussed steps of calculating variance, comparison to a desired variance, then using such to provide an average pixel value, which is then used to produce the image which is noise free. Thus, clearly, even if combined, the two cited references would not teach or make obvious the instant invention as now recited in new claims 18-34.

In further contradistinction, Avinash 6,208,763 (called 763)

defines structure and non-structure images by pixel data, with the two being processed differently. The structures are identified by computing gradient information on each pixel and comparing the information to a threshold, and comparing the gradient directions for adjacent pixels. The edges defining the structures are filtered. The structures are smoothed and sharpened. The non-structures are smoothed and blended back into the non-structures regions.

There is nothing close to obtaining variances of pixel values, comparing same with desired values, then obtaining average pixel values and then using such average pixel values to produce images which are filtered and noise free.

The Examiner cited 763 for the purpose of "producing an image..... range (col. 10, lines 35-60)" Careful study of this portion of the patent does not teach this. This part merely discusses "orientation smoothing". It uses "maximum/minimum statistical variances of each pixel" which is compared to "parameter R", which is the relaxation factor for the local orientation filtering. Reference is made to FIG. 11. But, reading the entire patent disclosure shows that 763 is merely teaching smoothing techniques in the determining of images for structures and non-structures.

There is nothing related to filtering a reconstructed image utilizing pixels in the center of line of pixels and operating thereon for each line of pixels to determine variances and comparing such calculated variances to desired variances, the obtaining

average pixel values , which are then used to provide images. 763 does not calculate variances of pixels, compare with desired variances, then obtain average pixel values which are then used to provide filtered noise free images.

Clearly, combining both cited references would still not teach those steps above discussed, nor produce the results obtained by our invention. The techniques used by our invention are nowhere to be found in the cited references, nor would any extension thereof make same obvious.

Accordingly, the Section 103 rejection is no longer valid with respect to the claims now in the case. Allowance is respectfully solicited.

The inventor wishes to add the following "technical comments". "In regard to the Sec. 112 question, the calculation for pixels of selected one dimensional region are calculation for average and calculation for dispersion. Two dimensional Fourier transformation is not done in the calculation."

"In regard to the Sec. 103 rejection, a plurality of kinds of regions (namely "kernels") are determined around a noticed pixel as shown in FIGS. 6-17. We call the kernels as shown in FIGS. 6-9 "S1", "S2", "S3" and "S4" respectively after this. Our invention calculations dispersion (v1) for pixels of S1 at first. (Step 506 in FIG. 5). It evaluates whether V1 is within a pre-determined value (Sn) or not(see Step 508, FIG. 5). If V1 is not with the predetermined value (Sn), it calculates dispersion (v2) for pixels of S2 next. Like this, if V1 is within Sn, it does not calculate dispersion (v2,v3 and v4) for pixels S2,S3 and S4

and it advances the process to Step 522 of FIG. 5."

"Our invention thus saves a substantial amount of calculations"

"On the other hand, the disclosures of USP 5,933,540 (especially, col. 11, lines 55- col. 12, line 29) and of USP 6,208,763 (especially FIG. 12) calculate ALL the dispersions, etc."

"Thus, our invention reduces calculation time.. and hence, substantially improves the efficiency of the imaging techniques. It should be noted that time it takes to , for example, calculate various items, is very important to the patient and to the operator. In today's environment, every means possible is being used to make more efficient the imaging techniques, for example, and especially the time required. Our invention saves substantial amounts of time of calculation because we do not calculate all the dispersions, as does the prior art."

"Moreover, clearly, the instant invention of FIG.5 is not disclosed in the cited art."

Accordingly. reconsideration and allowance are respectfully solicited.

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17 July 04

Respectfully
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